

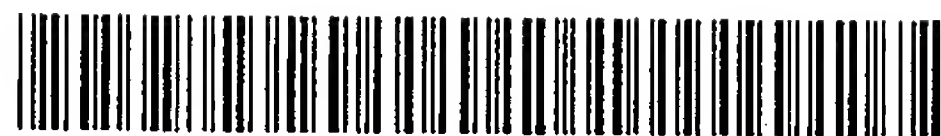
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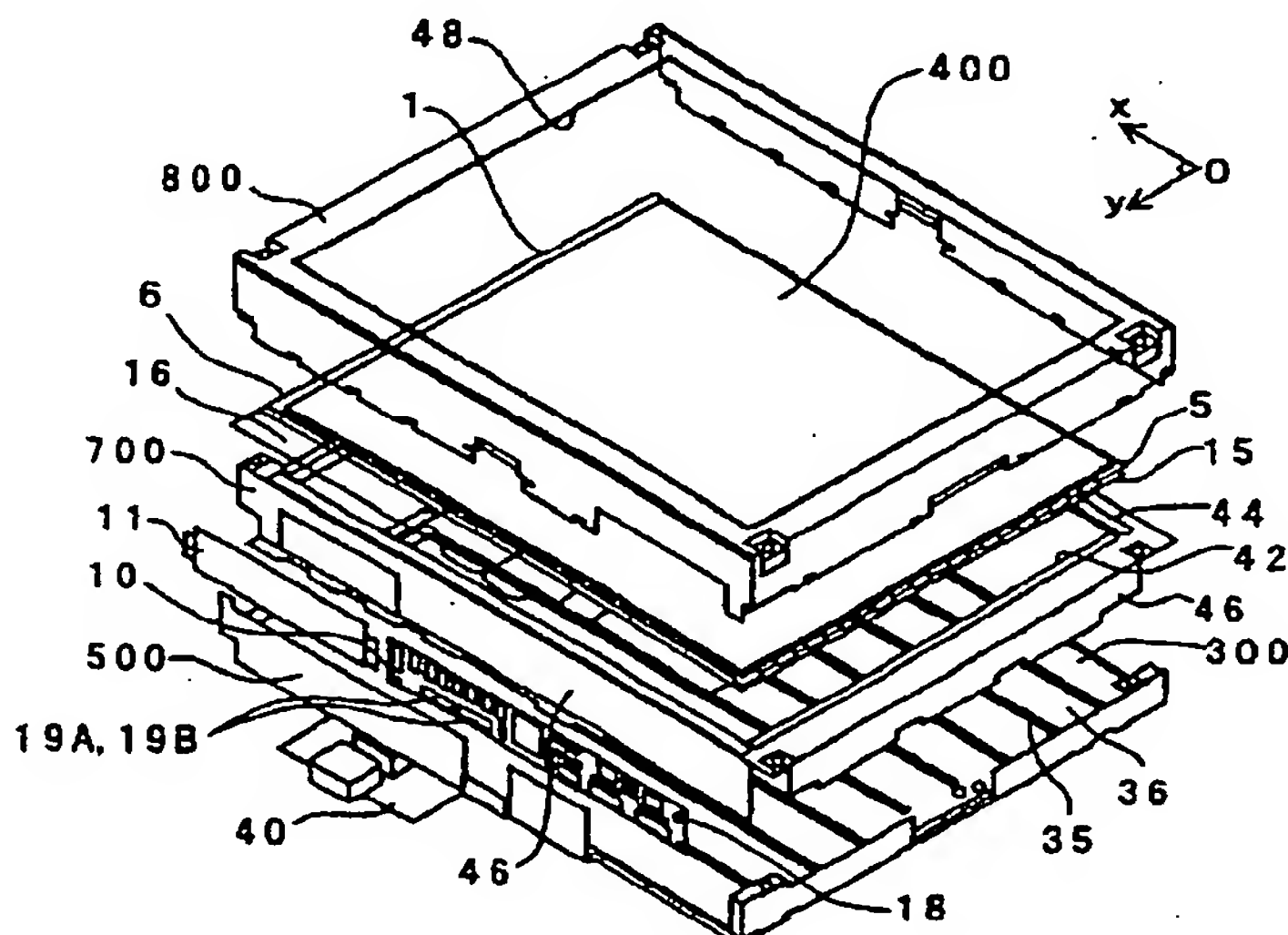
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(54) Backlight control for a liquid crystal display device

(57) In a liquid crystal display device having a backlight (300), the backlight has a first state which outputs a first amount of light and a second state which generates a second amount of light and the time for the first state and the time for the second state are controlled.

Due to such a constitution, the liquid crystal display device can display clear motion picture images in spite of a simple constitution thereof. Further, the liquid crystal display device can display clear and bright motion picture images.

FIG. 3





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EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|--|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| X | WO 95 01701 A (PHILIPS ELECTRONICS UK LTD ; PHILIPS ELECTRONICS NV (NL); PHILIPS N) 12 January 1995 (1995-01-12) * the whole document * | 1-6, 31, 32, 37 | G09G3/34 G09G3/36 |
| X | WO 97 31359 A (PHILIPS ELECTRONICS NV ; PHILIPS NORDEN AB (SE)) 28 August 1997 (1997-08-28) * the whole document * | 1, 4, 5, 31-33 | |
| X | EP 0 685 831 A (SHARP KK) 6 December 1995 (1995-12-06) * the whole document * | 1-4, 6, 32 7-17 | |
| X | EP 1 014 332 A (SHARP KK) 28 June 2000 (2000-06-28) * the whole document * | 1-4, 6, 32 7-17 | |
| Y | WO 00 68926 A (ARIMOTO KATSUYUKI ; FUNAMOTO TARO (JP); OTA YOSHIHITO (JP); KOBAYAS) 16 November 2000 (2000-11-16) * the whole document * -& EP 1 111 578 A (MATUSHITA ELECTRICAL INDUSTRIAL CO., LTD.) 27 June 2001 (2001-06-27) * the whole document * *assumed translation of WO-A-0068926* | 7-17 | TECHNICAL FIELDS SEARCHED (Int.Cl.7) G09G |
| X | WO 91 10223 A (SARNOFF DAVID RES CENTER) 11 July 1991 (1991-07-11) * the whole document * | 21, 23-25, 29, 34-36 | |
| <p>The present search report has been drawn up for all claims</p> | | | |
| Place of search MUNICH | | Date of completion of the search 23 July 2003 | Examiner Harke, M |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 12 6475

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|--|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| X | WO 93 13514 A (PANOCORP DISPLAY SYSTEMS) 8 July 1993 (1993-07-08) * the whole document * | 21, 23-25, 29, 34-36 | |
| X | US 5 347 201 A (GE SHICHAO ET AL) 13 September 1994 (1994-09-13) * the whole document * | 23, 34-36 | |
| A | US 5 796 382 A (BEETESON JOHN S) 18 August 1998 (1998-08-18) * the whole document * | 18-29, 34-36 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.7) |
| | | | |
| The present search report has been drawn up for all claims | | | |
| Place of search MUNICH | | Date of completion of the search 23 July 2003 | Examiner Harke, M |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document</p> | | | |

EPO FORM 1503 03.02 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
1-29, 31-37
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-17,31-33,37

The first concept concerns an liquid crystal display with a backlight having a first and a second state, wherein

- a detection means detects the magnitude/the magnitude of the change of video signals supplied to the pixels of the liquid crystal display, and
- a backlight blinking means repeatedly lights and extinguishes the backlight when the detection means detects that the magnitude/the magnitude of the change of the video signals of the video signals is large.

2. Claims: 18-29,34-36

The second concept concerns an liquid crystal display with a backlight having a first and a second state, wherein

- the backlight includes a plurality of light sources, and
- at least a first of the light sources and a second of the light sources differ in their lighting behaviour.

3. Claim : 30

The third concept concerns an liquid crystal display with a backlight having a first and a second state, wherein

- the liquid crystal display has a motion and a still picture mode, and
- the frequency of rewriting an image is higher in the motion than in the still picture mode.

4. Claims: 38-41

The fourth concept concerns an liquid crystal display with a backlight having a first and a second state, wherein

- the screen becomes a black display during one screen scanning,
- one frame in which an amount of light is changed is repeated.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-07-2003

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
| WO 9501701 A | 12-01-1995 | DE 69421511 D1 | 09-12-1999 |
| | | DE 69421511 T2 | 27-04-2000 |
| | | EP 0666009 A1 | 09-08-1995 |
| | | WO 9501701 A1 | 12-01-1995 |
| | | JP 8500915 T | 30-01-1996 |
| | | US 5912651 A | 15-06-1999 |
| WO 9731359 A | 28-08-1997 | WO 9731359 A2 | 28-08-1997 |
| EP 0685831 A | 06-12-1995 | JP 3027298 B2 | 27-03-2000 |
| | | JP 7325286 A | 12-12-1995 |
| | | DE 69512704 D1 | 18-11-1999 |
| | | DE 69512704 T2 | 27-04-2000 |
| | | EP 0685831 A1 | 06-12-1995 |
| | | KR 166145 B1 | 20-03-1999 |
| | | US 5844540 A | 01-12-1998 |
| EP 1014332 A | 28-06-2000 | JP 2000241796 A | 08-09-2000 |
| | | EP 1014332 A2 | 28-06-2000 |
| | | KR 2000048407 A | 25-07-2000 |
| | | US 6429839 B1 | 06-08-2002 |
| WO 0068926 A | 16-11-2000 | JP 3340703 B2 | 05-11-2002 |
| | | JP 2001027889 A | 30-01-2001 |
| | | JP 3215388 B2 | 02-10-2001 |
| | | JP 2001027890 A | 30-01-2001 |
| | | CA 2336803 A1 | 16-11-2000 |
| | | CN 1304522 T | 18-07-2001 |
| | | EP 1111578 A1 | 27-06-2001 |
| | | WO 0068926 A1 | 16-11-2000 |
| | | JP 3215399 B1 | 02-10-2001 |
| | | JP 2002055664 A | 20-02-2002 |
| | | JP 3215400 B1 | 02-10-2001 |
| | | JP 2002041007 A | 08-02-2002 |
| | | JP 3340733 B2 | 05-11-2002 |
| | | JP 2002258822 A | 11-09-2002 |
| | | JP 3340734 B2 | 05-11-2002 |
| | | JP 2002258823 A | 11-09-2002 |
| | | JP 3340735 B2 | 05-11-2002 |
| | | JP 2002311925 A | 25-10-2002 |
| WO 9110223 A | 11-07-1991 | DE 69025341 D1 | 21-03-1996 |
| | | DE 69025341 T2 | 29-08-1996 |
| | | EP 0528797 A1 | 03-03-1993 |
| | | JP 3233927 B2 | 04-12-2001 |
| | | JP 5504416 T | 08-07-1993 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-07-2003

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|---|---------------------|----------------------------|---------------------|
| WO 9110223 | A | | KR 212866 B1 | 02-08-1999 |
| | | | US 5337068 A | 09-08-1994 |
| | | | WO 9110223 A1 | 11-07-1991 |
| WO 9313514 | A | 08-07-1993 | US 5347201 A | 13-09-1994 |
| | | | AU 3325793 A | 28-07-1993 |
| | | | WO 9313514 A1 | 08-07-1993 |
| | | | US 5402143 A | 28-03-1995 |
| | | | CN 1083934 A | 16-03-1994 |
| | | | MX 9303729 A1 | 31-05-1994 |
| US 5347201 | A | 13-09-1994 | US 5229691 A | 20-07-1993 |
| | | | AU 3325793 A | 28-07-1993 |
| | | | CN 1083934 A | 16-03-1994 |
| | | | MX 9303729 A1 | 31-05-1994 |
| | | | WO 9313514 A1 | 08-07-1993 |
| | | | EP 0446041 A2 | 11-09-1991 |
| | | | US 5565742 A | 15-10-1996 |
| | | | US 5621284 A | 15-04-1997 |
| | | | US 5859508 A | 12-01-1999 |
| | | | AU 2372992 A | 23-02-1993 |
| | | | CN 1083264 A | 02-03-1994 |
| | | | DE 69224198 D1 | 26-02-1998 |
| | | | DE 69224198 T2 | 03-09-1998 |
| | | | EP 0598764 A1 | 01-06-1994 |
| | | | JP 3295669 B2 | 24-06-2002 |
| | | | JP 7506211 T | 06-07-1995 |
| | | | WO 9302442 A1 | 04-02-1993 |
| | | | US 5402143 A | 28-03-1995 |
| US 5796382 | A | 18-08-1998 | GB 2298075 A | 21-08-1996 |

EPO FORM P/459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82